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MECHANICAL-PROPERTY DATA
62Be-38Al ALLOY

Annealed Sheet

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Prepared by

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Notices

62Be-38Al

This material is a recently developed alloy containing 62 percent beryllium and 38 percent aluminum. It was developed specifically for aerospace structural applications and has useful structural properties at elevated temperatures.

The alloy combines high modulus and low density with the high formability and machining characteristics of the more common magnesium alloys.

62Be-38Al has been joined by fusion welding using both TIG and electron-beam techniques. Limited tests indicate that brazing and soldering may require special techniques and handling procedures.

Observance of the same exposure criteria as used for working or handling beryllium is recommended for 62Be-38Al.

This material is currently available in sheet form 0.032 to 0.100 inch in thickness, up to 12-inch widths and 24-inch lengths.

62Be-38Al ALLOY SHEET DATA

Condition: Annealed[(a)]
Thickness: 0.062 inch

Properties	Temperature, F				
	-320	RT	400	600	800
Tensile[(c)]					
F_{tu} (longitudinal), ksi	60.1	50.4	39.0	22.0	24.3
F_{tu} (transverse), ksi	58.8	50.9	39.7	22.2	24.1
F_{ty} (longitudinal), ksi	41.8	36.6	30.9	21.0	21.0
F_{ty} (transverse), ksi	43.1	36.1	31.3	21.2	20.7
e_t (longitudinal), percent in 1 in.	2.4	8.1	10.6	4.0	5.0
e_t (transverse), percent in 1 in.	2.8	8.2	11.9	5.0	5.5
RA (longitudinal), percent	2.4	7.3	13.4	--	10.8
RA (transverse), percent	2.8	8.6	14.6	--	11.2
E_t (longitudinal), 10^6 psi	30.0	29.2	28.8	20.5	16.9
E_t (transverse), 10^6 psi	30.0	29.1	30.1	19.7	17.2
Compression[(c)]					
F_{cy} (longitudinal), ksi		34.2	27.7	24.4	14.0
F_{cy} (transverse), ksi		34.3	28.4	23.8	14.4
E_c (longitudinal), 10^6 psi		29.1	29.4	19.7	17.0
E_c (transverse), 10^6 psi		29.1	29.4	19.2	17.0
Impact (V-notch Charpy), ft-lb		U[(b)]	U	U	U

(16 pp)(5 fig.)(tbls.)(2 ref.)

62Be-38Al ALLOY SHEET DATA (Continued)

Properties	Temperature, F -320	RT	400	600	800
Fracture Toughness (K_{Ic})(d)		No pop-in	U	U	U
Bend(e) (min. radius), degrees					
Longitudinal	28	44	U	25	U
Transverse	32	39	U	29	U
Shear(e)					
F_{su} (longitudinal), ksi		27.2	21.5	U	10.8
F_{su} (transverse), ksi		27.0	21.6	U	10.7
Axial Fatigue (Transverse)(f)					
Unnotched, R = 0.1					
10^3 cycles, ksi		46.0	32.0	25.0	U
10^5 cycles, ksi		34.0	26.0	21.0	U
10^7 cycles, ksi		28.0	21.0	18.0	U
Notched, R = 0.1, K_t = 3.0					
10^3 cycles, ksi		35.0	32.0	23.0	U
10^5 cycles, ksi		21.0	20.0	15.0	U
10^7 cycles, ksi		15.0	13.0	9.0	U
Creep (transverse)(g)					
0.5% elongation 100 hr, ksi		NA(b)	20.5	11.0	2.7
0.5% elongation 1000 hr, ksi		NA	19.0	9.2	2.0
Stress Rupture(g)					
Rupture 100 hr, ksi		NA	23.0	12.0	3.5
Rupture 1000 hr, ksi		NA	21.0	10.0	2.5
Stress Corrosion(h)					
80 percent F_{ty} 1000 hr, max.		No cracks	U	U	U
Coefficient of Thermal Expansion(i), in./in./F					
77 to 300 F = 9.2					
77 to 800 F = 10.3					
Density(i), lb/in.^{3} 0.0756					

Note:

Bearing(a)	RT	400	600	800
F_{bru} (longitudinal), ksi	96.4	67.9	U	34.8
F_{bru} (transverse), ksi	98.7	66.9	U	31.8
F_{bry} (longitudinal), ksi	66.1	58.5	U	29.7
F_{bry} (transverse), ksi	69.5	54.9	U	30.2

(a) Annealed 1100 F, 24 hr; etched aqueous solution 2 percent hydrofluoric acid, 28 percent nitric acid.
(b) NA, not applicable; U, unavailable.
(c) Data at 600 F are average of triplicate tests at Battelle; all other data from Reference (1).
(d) Fatigue-cracked center-notched specimens (0.062 x 3 x 12 inch).
(e) Values from Reference (1). Bend test, 3-point simple beam; shear test, sheet single shear.
(f) "R" represents algebraic ratio of the minimum stress to the maximum stress in one cycle; that is, $R = S_{min}/S_{max}$. "K_t" represents Neuber-Peterson theoretical stress concentration factor.
(g) Values from Battelle tests.
(h) Alternate immersion 3-1/2 percent NaCl, 3-point loading bend test.
(i) Values from Reference (2).

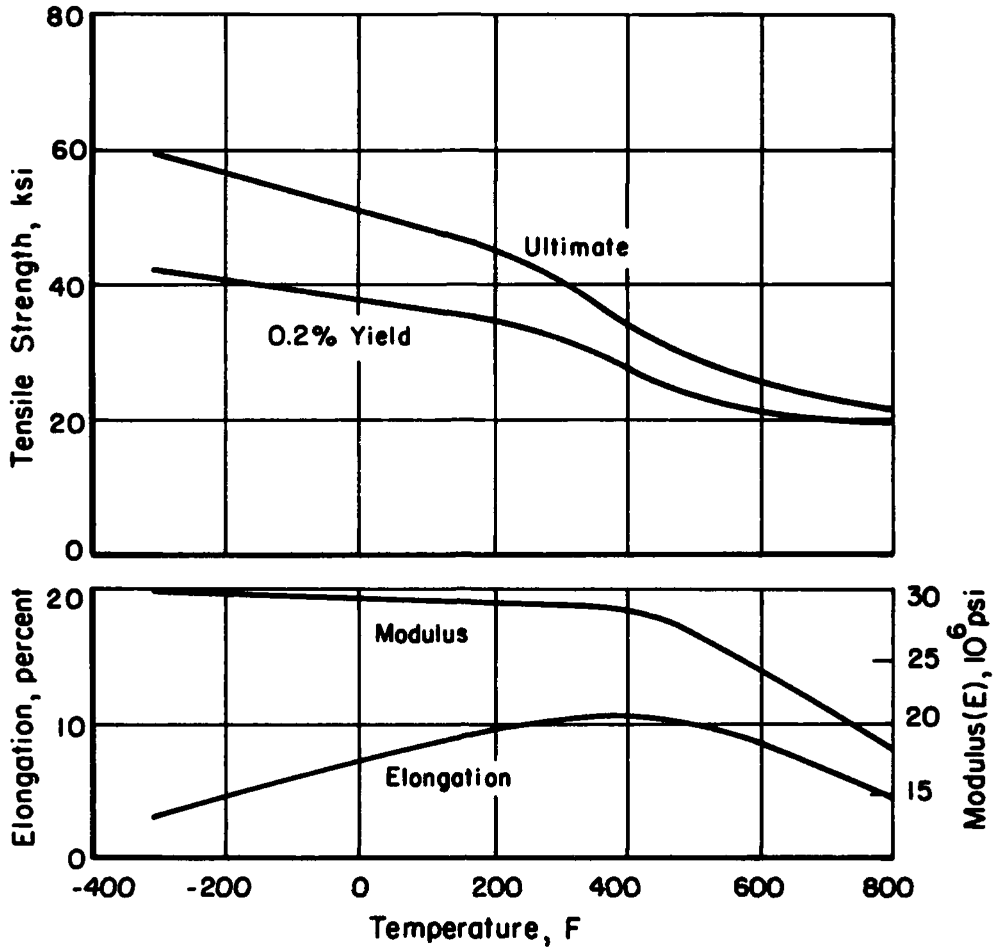

FIGURE 1. EFFECT OF TEMPERATURE ON THE TENSILE PROPERTIES OF 62Be-38Al ALLOY SHEET

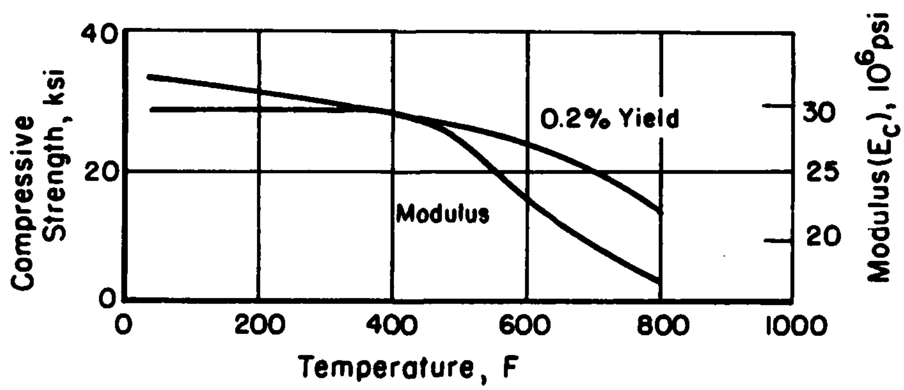

FIGURE 2. EFFECT OF TEMPERATURE ON THE COMPRESSIVE PROPERTIES OF 62Be-38Al ALLOY SHEET

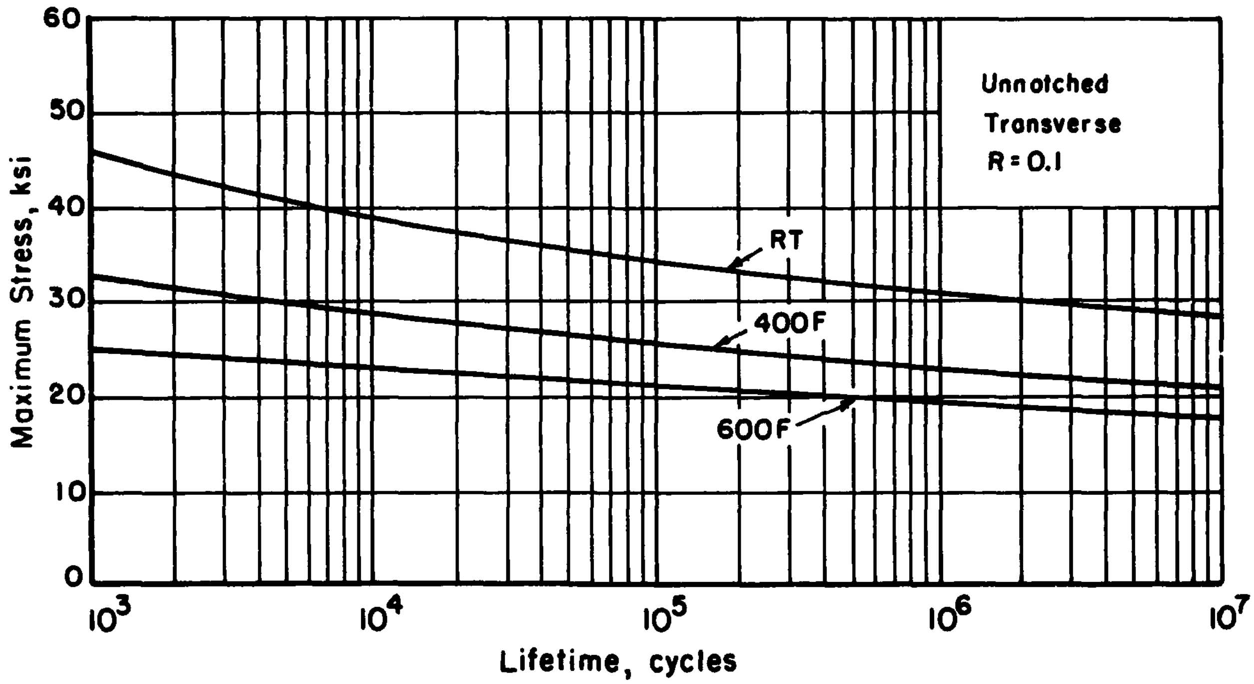

FIGURE 3. AXIAL-LOAD FATIGUE RESULTS FOR 62Be-38Al ALLOY SHEET

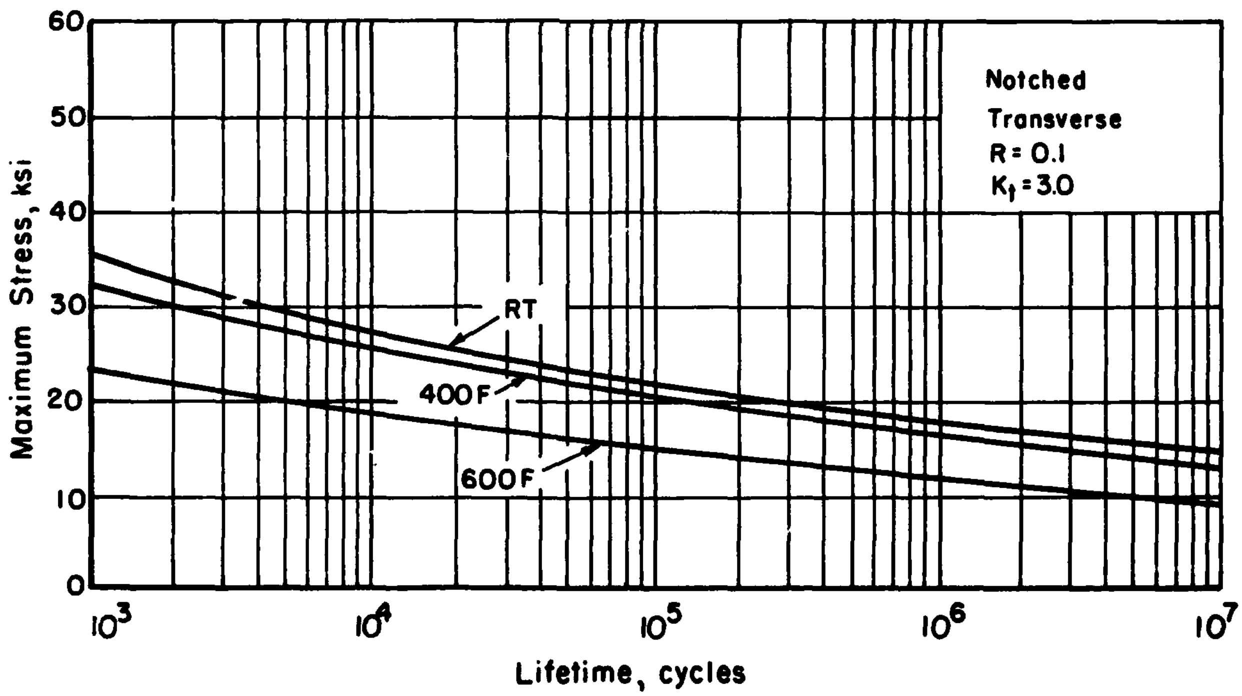

FIGURE 4. AXIAL-LOAD FATIGUE RESULTS FOR NOTCHED (K_t = 3.0) 62Be-38Al ALLOY SHEET

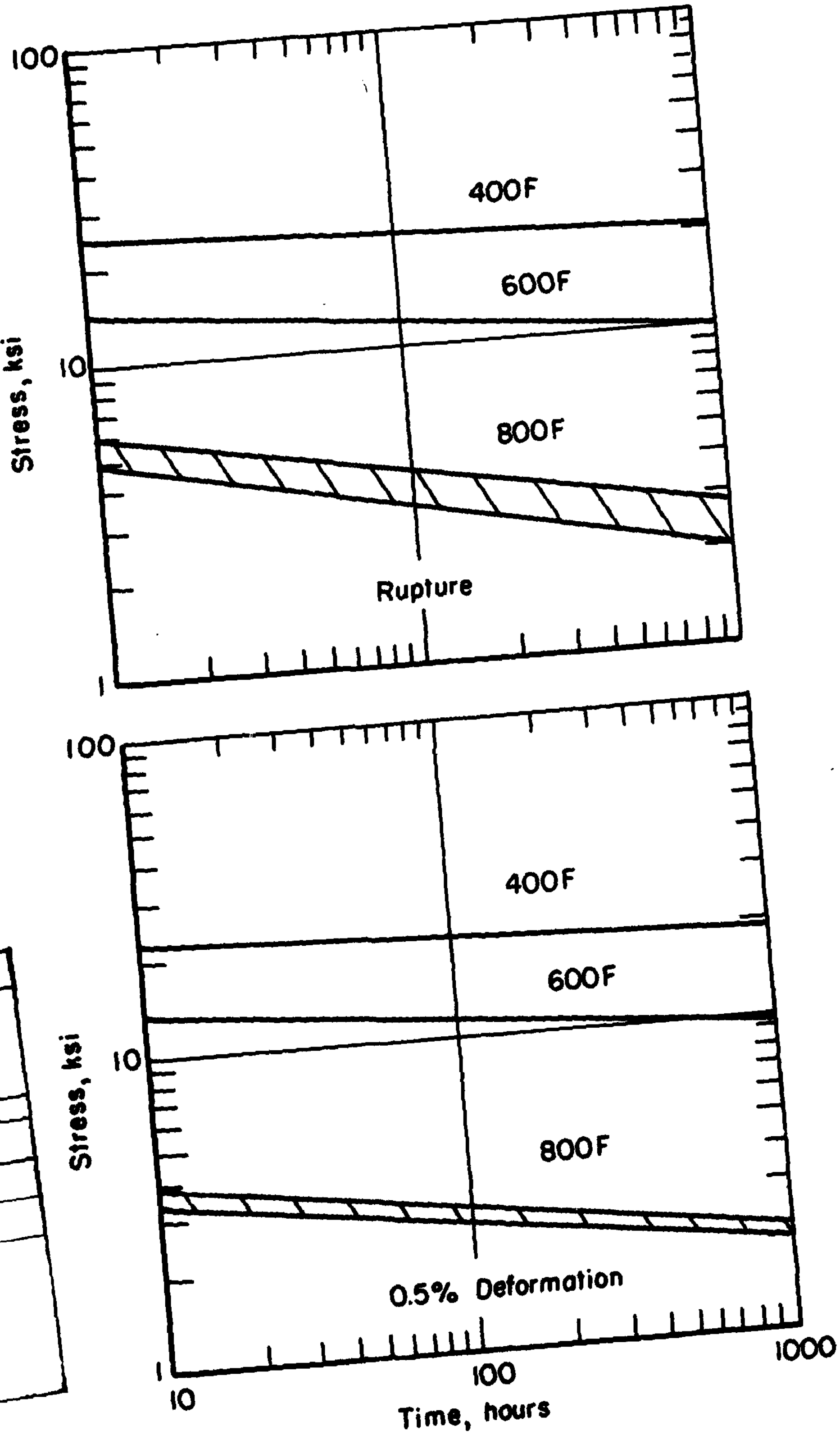

FIGURE 5. STRESS-RUPTURE AND 0.5% DEFORMATION CURVES FOR 62Be-38Al ALLOY SHEET

REFERENCES

(1) Fenn, R. W., Jr., et al, "Evaluation of Be-38% Al Alloy", Report NAS-8-11448, Materials Science Laboratory, Lockheed Missiles and Space Company (March, 1965).

(2) Berylco Product Information, FDJ-864-1SM.